

JAPAN

EDICT OF GOVERNMENT

In order to promote public education and public safety, equal justice for all, a better informed citizenry, the rule of law, world trade and world peace, this legal document is hereby made available on a noncommercial basis, as it is the right of all humans to know and speak the laws that govern them.

JIS C 9335-2-90 (2003) (English): Household and similar electrical appliances -- Safety -- Part 2-90: Particular requirements for commercial microwave ovens

安

*The citizens of a nation must
honor the laws of the land.*

Fukuzawa Yukichi

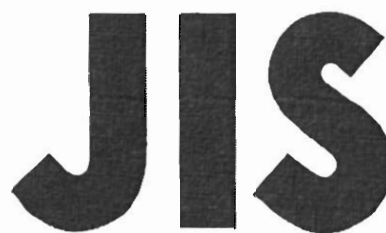
併

BLANK PAGE



BLANK PAGE





JAPANESE
INDUSTRIAL
STANDARD

Translated and Published by
Japanese Standards Association

JIS C 9335-2-90 : 2003

(JEMA)

**Household and similar electrical
appliances—Safety—
Part 2-90 : Particular requirements
for commercial microwave ovens**

ICS 13.120; 29.020; 97.040.20

Reference number : JIS C 9335-2-90 : 2003 (E)

PROTECTED BY COPYRIGHT

17 S

Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee, as the result of proposal for revision of Japanese Industrial Standard submitted by The Japan Electrical Manufacturers' Association (JEMA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law applicable to the case of revision by the provision of Article 14. Consequently **JIS C 9335-2-90 : 2001** is replaced with this Standard.

This revision has been made based on **IEC 60335-2-90 : 2002** *Household and similar electrical appliances—Safety—Part 2-90 : Particular requirements for commercial microwave ovens* for the purposes of making it easier to compare this Standard with International Standard; to prepare Japanese Industrial Standard conforming with International Standard; and to propose a draft of an International Standard which is based on Japanese Industrial Standard.

Attention is drawn to the possibility that some parts of this Standard may conflict with a patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have technical properties. The relevant Minister and the Japanese Industrial Standards Committee are not responsible for identifying the patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have the said technical properties.

Date of Establishment: 2001-03-20

Date of Revision: 2003-12-20

Date of Public Notice in Official Gazette: 2003-12-22

Investigated by: Japanese Industrial Standards Committee

Standards Board

Technical Committee on Electricity Technology

JIS C 9335-2-90:2003, First English edition published in 2004-07

Translated and published by: Japanese Standards Association
4-1-24, Akasaka, Minato-ku, Tokyo, 107-8440 JAPAN

In the event of any doubts arising as to the contents,
the original JIS is to be the final authority.

© JSA 2004

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

Printed in Japan

Contents

	Page
Introduction	1
1 Scope	1
2 Normative references	2
3 Definitions	2
4 General requirement	3
5 General conditions for the tests	3
6 Classification	4
7 Marking and instructions	4
8 Protection against access to live parts	5
9 Starting of motor-operated appliances	5
10 Power input and current	6
11 Heating	6
12 Void	6
13 Leakage current and electric strength at operating temperature	6
14 Transient overvoltages	6
15 Moisture resistance	6
16 Leakage current and electric strength	7
17 Overload protection of transformers and associated circuits	7
18 Endurance	7
19 Abnormal operation	8
20 Stability and mechanical hazards	10
21 Mechanical strength	10
22 Construction	12
23 Internal wiring	16
24 Components	16
25 Supply connection and external flexible cords	17
26 Terminals for external conductors	18

27	Provision for earthing.....	18
28	Screws and connections.....	18
29	Clearances, creepage distances and solid insulation	18
30	Resistance to heat and fire.....	18
31	Resistance to rusting	18
32	Radiation, toxicity and similar hazards	18
	Annexes	20
	Annex 1 (informative) Comparison table between JIS and corresponding International Standard	21

Household and similar electrical appliances—Safety—Part 2-90 : Particular requirements for commercial microwave ovens

Introduction This Japanese Industrial Standard has been prepared based on IEC 60335-2-90 *Household and similar electrical appliances—Safety—Part 2-90 : Particular requirements for commercial microwave ovens* published in 2002 as the second edition with some modifications of the technical contents and to be read together with JIS C 9335-1 : 2003 *Household and similar electrical appliances—Safety—Part 1 : General requirements*.

Portions underlined with dots are the matters in which the contents of the original International Standard have been modified. The list of modifications with the explanations is given in Annex 1 (informative).

1 Scope This Standard deals with the safety of microwave ovens intended for commercial use, their rated voltage being not more than 250 V for single-phase appliances and 480 V for other appliances.

Appliances covered by this Standard incorporate a door for user access to the cavity.

NOTE 101 The appliance may be built into a vending machine, in which case JIS C 9335-2-75 may also be applicable.

NOTE 102 JIS C 9335-2-36 or JIS C 9335-2-42 may also be applicable to ovens incorporating conventional heating means.

NOTE 103 Appliances that use non-electrical energy are within the scope of this Standard.

In general, this Standard does not take into account

- the use of appliances by young children or infirm persons without supervision;
- playing with the appliance by young children.

NOTE 104 Attention is drawn to the fact that

- for appliances intended to be used in vehicles or on board ships or aircraft, additional requirements may be necessary;
- in many countries, additional requirements are specified by the national health authorities, the national authorities responsible for the protection of labour, the water work authorities and similar authorities.

NOTE 105 This standard does not apply to

- household microwave ovens including combination microwave ovens (JIS C 9335-2-25)
- conveyor-type microwave ovens;
- industrial microwave heating equipment (IEC 60519-6)

- appliances for medical purposes (**IEC 60601-1**)
- appliances intended to be used in locations where special conditions prevail, such as the presence of a corrosive or explosive atmosphere (dust, vapour or gas).

NOTE : The International Standard corresponding to this Standard is as follows.

In addition, symbols which denote the degree of correspondence in the contents between the relevant International Standard and **JIS** are IDT (identical), MOD (modified), and NEQ (not equivalent) according to **ISO/IEC Guide 21**.

IEC 60335-2-90 : 2002 *Household and similar electrical appliances—Safety—Part 2-90 : Particular requirements for commercial microwave ovens* (MOD)

2 Normative references Clause 2 of **JIS C 9335-1** is applicable except as follows.

JIS C 9335-2-36 *Safety of household and similar electrical appliances—Part 2-36 : Particular requirements for commercial electric cooking ranges, ovens, hobs and hob elements*

NOTE : **IEC 60335-2-36** : 1993 *Safety of household and similar electrical appliances—Part 2-36 : Particular requirements for commercial electric cooking ranges, ovens, hobs and hob elements* is equivalent to the said standard.

JIS C 9335-2-42 *Safety of household and similar electrical appliances—Part 2-42 : Particular requirements for commercial electric forced convection ovens, steam cookers and steam-convection ovens*

NOTE : **IEC 60335-2-42** : 1994 *Safety of household and similar electrical appliances—Part 2-42 : Particular requirements for commercial electric forced convection ovens, steam cookers and steam-convection ovens* is equivalent to the said standard.

JIS C 9335-2-75 *Safety of household and similar electrical appliances—Part 2 : Particular requirements for commercial dispensing appliances and vending machines*

NOTE : **IEC 60335-2-75** : 1994 *Safety of household and similar electrical appliances—Part 2-75 : Particular requirements for commercial dispensing appliances and vending machines* is identical with the said standard.

3 Definitions Clause 3 of **JIS C 9335-1** is applicable except as follows. **3.1.7** and **3.1.9** are respecified in this Standard.

3.1.7 rated frequency **3.1.7** of **JIS C 9335-1** is applicable except as follows.

NOTE 101 The rated frequency is the input frequency.

3.1.9 normal operation

operation of the appliance under the following conditions

The appliance is operated with $1\,000\text{ g} \pm 50\text{ g}$ of potable water at an initial temperature of $20\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ in a cylindrical borosilicate glass vessel having a maximum thickness of 3 mm and an outside diameter of approximately 190 mm. The vessel is placed on the centre of the shelf. If the rated microwave power output exceeds 2 200 W, two such vessels are used and placed contiguously in the cavity.

3.101 microwave oven

appliance using electromagnetic energy in one or several of the ISM frequency bands between 300 MHz and 30 GHz, for heating food and beverages in a cavity

Information : ISM frequency bands are the electromagnetic frequencies established by the ITU and reproduced in CISPR11.

3.102 rated microwave power output

microwave power output assigned to the appliance by the manufacturer

3.103 cavity

space enclosed by the inner walls and the door in which the load is placed

3.104 shelf

horizontal support in the cavity on which the load is placed

3.105 door interlock

device or system that prevents the operation of the magnetron unless the oven door is closed

3.106 monitored door interlock

door interlock system that incorporates a supervision device

3.107 temperature-sensing probe

device that is inserted into the food to measure its temperature and is a part of an oven control

4 General requirement Clause 4 of JIS C 9335-1 is applicable.

5 General conditions for the tests Clause 5 of JIS C 9335-1 is applicable except as follows. 5.2 and 5.3 are specified in this Standard.

5.2 5.2 of JIS C 9335-1 is applicable except as follows.

NOTE 101 An additional sample may be required for the test of 19.104. Six samples of the interlocks are required for the test of 24.1.4.

5.3 Modification:

Instead of carrying out the tests in the order of clauses, the following sequence of clauses and subclauses applies: 32, 22.113, 22.108, 22.115, 7 to 17, 20, 21 (except 21.101 to 21.105), 18, 19 (except 19.104), 22 (except 22.108, 22.113 and 22.116), 23 to 31, 21.101 to 21.105 and 19.104.

5.101 Microwave ovens are tested as motor-operated appliances.

5.102 Class III temperature-sensing probes are only subjected to the tests of **22.112**.

6 Classification Clause **6** of **JIS C 9335-1** is applicable except as follows. **6.1** is respecified in this Standard.

6.1 **6.1** of **JIS C 9335-1** is applicable except as follows.

Microwave ovens shall be class 0I or class I.

7 Marking and instructions Clause **7** of **JIS C 9335-1** is applicable except as follows. **7.1**, **7.6**, **7.12** and **7.14** are respecified in this Standard.

7.1 **7.1** of **JIS C 9335-1** is applicable except as follows.

Appliances shall be marked with the nominal frequency in megahertz of the ISM band in which they operate.

If the removal of any cover results in microwave leakage exceeding the value specified in clause **32**, the cover shall be marked with the substance of the following:

WARNING : Microwave energy—Do not remove this cover

If an appliance incorporates a socket-outlet protected by means of fuses other than D-type fuses, it shall be marked with the rated current of the relevant fuse. When a miniature fuse-link is provided, this marking shall indicate that the fuse-link is to have a high breaking capacity.

7.6 **7.6** of **JIS C 9335-1** is applicable except as follows.

Add the following symbol:



(symbol 5021 of **IEC 60417**) equipotentiality

7.12 **7.12** of **JIS C 9335-1** is applicable except as follows.

The instructions shall include the substance of the following.

- Warning: If the door or door seals are damaged, the oven must not be operated until it has been repaired by a competent person;
- Warning: It is hazardous for anyone other than a competent person to carry out any service or repair operation that involves the removal of any cover which gives protection against exposure to microwave energy;
- Warning: Liquids or other foods must not be heated in sealed containers since they are liable to explode;
- Warning: Microwave heating of beverages can result in delayed eruptive boiling, therefore care must be taken when handling the container;
- Warning: The contents of feeding bottles and baby food jars must be stirred or shaken and the temperature checked before consumption, in order to avoid burns;

- the minimum height of free space necessary above the top surface of the oven;
- only use utensils that are suitable for use in microwave ovens;
- when heating food in plastic or paper containers, keep an eye on the oven due to the possibility of ignition;
- if smoke is observed, switch off or unplug the appliance and keep the door closed in order to stifle any flames;
- eggs in their shell and whole hard-boiled eggs should not be heated in microwave ovens since they may explode even after microwave heating has ended;
- details for cleaning door seals, cavities and adjacent parts;
- the oven should be cleaned regularly and any food deposits removed;
- failure to maintain the oven in a clean condition could lead to deterioration of the surface that could adversely affect the life of the appliance and possibly result in a hazardous situation;
- only use the temperature probe recommended for this oven (for appliances having a facility to use a temperature-sensing probe);
- the appliance should not be cleaned with a water jet (for appliances intended to stand on the floor and which are not at least IPX5).

NOTE 101 If the oven is incorporated in a vending machine, these warnings and instructions may not be relevant and therefore not required.

7.14 7.14 of JIS C 9335-1 is applicable except as follows.

The warning specified in 7.1 shall be in lettering at least 3 mm high.

The warning specified in 7.101 shall be in lettering at least 5 mm high.

7.101 A label shall be provided, together with instructions for fixing it in a conspicuous place close to the appliance. The label shall state the substance of the following.

- Warning: Liquids or other foods must not be heated in sealed containers since they are liable to explode;
- Warning: Microwave heating of beverages can result in delayed eruptive boiling, therefore care must be taken when handling the container;
- Warning: The contents of feeding bottles and baby food jars must be stirred or shaken and the temperature checked before consumption, in order to avoid burns.

Compliance is checked by visual inspection.

8 Protection against access to live parts Clause 8 of JIS C 9335-1 is applicable.

9 Starting of motor-operated appliances Clause 9 of JIS C 9335-1 is not applicable.

10 Power input and current Clause 10 of JIS C 9335-1 is applicable.

11 Heating Clause 11 of JIS C 9335-1 is applicable except as follows. However 11.2, 11.7 and 11.8 are respecified in this Standard.

11.2 11.2 of JIS C 9335-1 is applicable except as follows.

Appliances, other than built-in appliances, are positioned as specified for heating appliances.

A ceiling is placed over the appliance at the minimum height stated in the instructions. The ceiling has a depth of 300 mm from the back wall of the test corner and a length at least 150 mm in excess of the width of the appliance.

Appliances intended to be fixed to the floor, and appliances with a mass greater than 40 kg and not provided with rollers, castors or similar means, are installed in accordance with the installation instructions. If no instructions are supplied, these appliances are placed on the floor as near as possible to the walls of the test corner.

11.7 11.7 of JIS C 9335-1 is applicable except as follows.

Appliances are operated in cycles, each cycle consisting of a heating period of 4 min followed by a rest period of 1 min until steady conditions are established. Boiling water is added to the water load when half of the water load has evaporated.

11.8 11.8 of JIS C 9335-1 is applicable except as follows.

The temperature rises of external surfaces are only measured on the surfaces that are not placed against the wall and the floor of the test corner.

There are no temperature limits for air-outlet grilles and for surfaces up to a distance of 25 mm from them.

12 Void

13 Leakage current and electric strength at operating temperature Clause 13 of JIS C 9335-1 is applicable.

14 Transient overvoltages Clause 14 of JIS C 9335-1 is applicable.

15 Moisture resistance Clause 15 of JIS C 9335-1 is applicable except as follows. 15.2 is additionally respecified in this Standard.

15.2 15.2 of JIS C 9335-1 is applicable except as follows.

A quantity of 0.5 L of water containing approximately 1 % NaCl is poured steadily over the shelf over a period of 1 min. If the shelf can collect spilled liquid, it is filled with the saline solution and a further 0.5 L is then added over a period of 1 min.

15.101 Temperature-sensing probes shall be constructed so that their insulation is not affected by water.

Compliance is checked by the following test.

The probe is completely immersed in water containing approximately 1 % NaCl and having a temperature of $20\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$. The water is heated to the boiling point in approximately 15 min. The probe is then removed from the boiling water and immersed in water having a temperature of $20\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ for 30 min.

This procedure is carried out five times, after which the probe is removed from the water. All traces of liquid are then removed from the surface.

The probe shall then withstand the leakage current test of 16.2.

NOTE: Detachable temperature-sensing probes are not connected to the appliance for this test. Non-detachable temperature-sensing probes are tested in the oven, the probe being immersed as much as possible.

16 Leakage current and electric strength Clause 16 of JIS C 9335-1 is applicable except as follows.

16.101.1 Switch mode The insulation between the primary and secondary windings of switch-mode power supply transformers is subjected for 1 min to a voltage of substantially sinusoidal waveform and having a frequency of 50 Hz or 60 Hz. The value of the voltage is 1.414 times the rated voltage plus 750 V, with a minimum of 1 250 V.

There shall be no breakdown between the coil and the layer.

16.101.2 Twice the rated voltage is induced in the secondary winding of the transformer by applying a sinusoidal voltage having a frequency higher than rated frequency to the primary terminals.

The duration of the test is

- 60 s, for frequencies up to twice the rated frequency, or
- $120 \times \frac{\text{rated frequency}}{\text{test frequency}}$ s, with a minimum of 15 s, for higher frequencies.

NOTE: The frequency of the test voltage is higher than the rated frequency to avoid excessive excitation current.

A maximum of one-third of the test voltage is applied and is then rapidly increased without creating transients. At the end of the test, the voltage is decreased in a similar manner to approximately one-third of its full value before switching off.

There shall be no breakdown between windings or between adjacent turns of the same winding.

17 Overload protection of transformers and associated circuits Clause 17 of JIS C 9335-1 is applicable except as follows.

The tests are not carried out on the power transformer that supplies the magnetron and its associated circuits, these are checked during the tests of clause 19.

18 Endurance Clause 18 of JIS C 9335-1 is replaced by the following.

The door system, including hinges, microwave seals and other associated parts, shall be constructed to withstand wear that may be expected in normal use.

Compliance is checked by the following test.

The door system is subjected to 10 000 cycles of operation with the appliance supplied at rated voltage and containing an appropriate microwave-absorbing load. It is then subjected to 10 000 cycles of operation without microwave generation.

The door is opened and closed as in normal use. It is opened from the closed position to an angle between 135° and 180° or the maximum possible angle if this is less. The rate of operation is six cycles per minute.

If a dry load is used, before starting the test and after each 10 000 cycles of operation, 100 g of water is added and the appliance operated until the water has evaporated.

This sequence is repeated until the door system has been subjected to a total of 200 000 cycles of operation.

After the test, the microwave leakage shall not exceed the limit specified in clause 32 and the door system shall still function.

NOTE 101 Controls may be rendered inoperative in order to carry out the test.

NOTE 102 Components, the deterioration of which does not impair compliance with this Standard, may be replaced in order to complete the test.

19 Abnormal operation Clause 19 of JIS C 9335-1 is applicable except as follows. 19.1, 19.11.2 and 19.13 are respecified in this Standard.

19.1 Modification:

Instead of subjecting the appliance to the tests of 19.2 to 19.10, compliance is checked by the tests of 19.101 to 19.104, the appliance being supplied at rated voltage.

19.11.2 19.11.2 of JIS C 9335-1 is applicable except as follows.

The cathode to anode circuit of the magnetron is open-circuited and short-circuited in turn. If one of these fault conditions results in an input current that increases with decreasing voltage, the test is carried out with the appliance supplied at 0.94 times rated voltage. However, if the input current increases more than proportionally with voltage, the appliance is supplied at 1.06 times rated voltage.

The filament of the magnetron is not short-circuited.

19.13 19.13 of JIS C 9335-1 is applicable except as follows.

The temperature of windings shall not exceed the values shown in Table 8. Only appliances that allow a preselected start time and those operating with a keep warm function are considered to be appliances operated until steady conditions are established.

During the tests, the microwave leakage shall not exceed 100 W/m² measured in accordance with clause 32 but with the load as specified for each subclause. The appliance shall comply with clause 32 if it can be operated after the tests.

19.101 Appliances are operated with controls set at the most unfavourable position and without a load in the cavity.

The period of operation is the maximum time allowed by the timer or until steady conditions are established, whichever is shorter.

19.102 Appliances are operated under normal operation with the timer or other controls that operate in normal use short-circuited.

NOTE : If the appliance is provided with more than one control, these are short-circuited in turn.

19.103 Appliances are operated under normal operation and with any single-fault condition simulated that is likely to occur. The controls are adjusted to their most unfavourable setting and the appliance is operated for the maximum time allowed by the timer or 90 min, whichever is shorter.

NOTE : Examples of fault conditions are

- blocking of air openings in the same plane;
- locking the rotor of motors if the locked rotor torque is smaller than the full load torque;
- locking moving parts liable to be jammed.

19.104 The appliance is operated with the controls adjusted to their most unfavourable setting and with potatoes placed on the shelf in the position where they are most likely to ignite and propagate flames to other combustible material.

Each potato has an approximately ellipsoidal shape and a mass between 125 g and 150 g. The length of the shorter principal axis is at least 40 mm. The length of the longer principal axis is not more than 140 mm and may be symmetrically reduced in order to obtain the specified mass. A steel wire, having a diameter of $1.5 \text{ mm} \pm 0.5 \text{ mm}$ and approximately the same length as the longer axis of the potato, is inserted along this axis of at least one of the potatoes. The number of potatoes to be used is stated in Table 101.

If the potatoes do not ignite, the test is repeated with the load reduced by one potato. If a single potato does not ignite, it is ignited artificially.

Table 101 Number of potatoes

Rated microwave power output W	Volume of the cavity L	Number of potatoes
< 600	≥ 14 and < 28	2
≥ 600 and < 1 000	≥ 28 and < 42	4
$\geq 1\ 000$ and < 2 000	≥ 42 and < 56	6
$\geq 2\ 000$	≥ 56	$6+N^a$

NOTE : The rated microwave power output or the volume of the cavity applies, whichever results in the higher number of potatoes.

N^a is 2 for each 500 W increase in power output or for each 14 L increase in volume.

The test is terminated 15 min after the microwave generation has ceased or a fire in the cavity has extinguished.

During the test, any fire in the cavity shall be contained within the appliance.

NOTE 1 **19.13** does not apply during the test.

After the test, if the appliance is still operable, any damaged detachable shelf is replaced and **19.13** applies. If the appliance does not comply, the test is repeated on a new appliance.

NOTE 2 Non-compliance may have resulted from the cumulative effects of previous tests.

20 Stability and mechanical hazards Clause **20** of **JIS C 9335-1** is applicable except as follows.

20.101 Appliances having doors with a horizontal hinge at their lower edge and on which a load is likely to be placed shall have adequate stability.

Compliance is checked by the following test.

The appliance is placed on a horizontal surface with the door open and a mass is gently placed on the geometric centre of the door.

For appliances normally used on the floor, the mass is

- 23 kg for cavity doors, or the mass that can be placed in the oven in accordance with the instructions, if this is higher;
- 7 kg for other doors.

For appliances normally used on a table, the mass is

- 7 kg for stationary appliances;
- 3.5 kg for other appliances.

The appliance shall not tilt.

NOTE 1 A sandbag may be used for the load.

NOTE 2 For appliances having more than one door, the tests are made on each door separately.

21 Mechanical strength Clause **21** of **JIS C 9335-1** is applicable except as follows.

Compliance is also checked by the tests of **21.101** to **21.105**.

21.101 Hinged doors are positioned approximately 30° before the fully open position. Sliding doors are positioned so that they are approximately two-thirds open. A force of 35 N is applied to the inside surface of a hinged door at a point 25 mm from its free edge or to the handle of a sliding door.

The force is applied by means of a spring balance having a spring constant of 1.05 N/mm. It is initially applied with an opposing force applied to the other side of the door or handle. The opposing force is then removed to allow the door to complete its travel to the fully open position.

The test is carried out 25 times.

The test is repeated on doors of stationary appliances and built-in appliances except that

- the door is initially placed midway between the fully open and closed positions;

- the applied force is 1.5 times the force required to open the door or 65 N, whichever is greater. However if the force cannot be measured or if the door is opened indirectly, the 65 N force is applied.

The test is carried out 25 times.

Doors are placed midway between the fully open and closed positions. A closing force of 90 N is applied to the outside surface of a hinged door at a point 25 mm from the free edge or to the handle of a sliding door, initially with the opposing force as described above.

This test is carried out 50 times.

The appliance shall then comply with clause 32.

21.102 Side-hinged doors are placed in the fully open position. A downward force of 140 N or the maximum force that can be applied in any door position without tilting the appliance, whichever is smaller, is then applied to the free edge of the door and the door is closed. The door is fully opened again with the force still applied.

The test is carried out 10 times.

Bottom-hinged doors are opened. A force of 140 N or the maximum force that can be applied without tilting the appliance, whichever is smaller, is applied to the inside surface of the door at the most unfavourable position 25 mm from the free edge.

The force is applied for 15 min.

The appliance shall then comply with clause 32.

21.103 A cube of wood having a side dimension of 20 mm is attached to an inside corner furthest from the door hinge. An attempt is made to close the door with a force of 90 N applied at the other corner farthest from the hinge in the direction perpendicular to the surface of the door.

The force is maintained for 5 s.

The cube is then removed. The door is slowly closed until microwave generation becomes possible. The door and its opening means are then manipulated in order to determine the position resulting in the highest microwave leakage.

The appliance shall then comply with clause 32.

The test is repeated with the wooden cube attached to the other corner farthest from the hinge.

NOTE : The test is not applicable to sliding doors.

21.104 The door is closed and its outside surface subjected to three impacts, each having an energy of 3 J. These impacts are applied to the central part of the door and may be at the same point.

The impact is applied by means of a steel ball having a diameter of 50 mm and a mass of approximately 0.5 kg. The ball is suspended by a suitable cord that is held in the plane of the door. The ball is allowed to fall as a pendulum through the distance required to strike the surface with the specified impact energy.

The door is then opened and its mating surface on the oven is subjected to three similar impacts.

The inside surface of a hinged door is subjected to three impacts as before, the test being made with the door in the fully open position. The impacts are applied to the central part of the door and may be at the same point. However, if a bottom-hinged door is horizontal when in the fully open position, the impacts are applied by allowing the steel ball to fall freely through a distance such that the specified impact energy is obtained.

A bottom-hinged door is further tested by subjecting its seal to three similar impacts. The impacts are made at three different locations.

The appliance shall then comply with clause 32.

21.105 A bottom-hinged door is opened and a hardwood dowel having a diameter of 10 mm and a length of 300 mm is placed along the bottom hinge. The dowel is positioned such that one end is flush with an outside edge of the door. A closing force of 140 N is applied to the centre of the handle in a direction perpendicular to the surface of the door. The force is maintained for 5 s.

The test is repeated with the end of the dowel flush with the other outside edge and then with the dowel positioned centrally within the door hinge.

The microwave leakage is measured under the conditions specified in clause 32 and shall not exceed 100 W/m².

22 Construction Clause 22 of JIS C 9335-1 is applicable except as follows.

22.101 Built-in appliances shall only be vented through the front, unless provisions are made for venting through a duct.

Compliance is checked by visual inspection.

22.102 Oven vents shall be constructed so that any moisture or grease discharged through them cannot affect creepage distances and clearances between live parts and other parts of the appliance.

Compliance is checked by visual inspection.

22.103 Appliances shall incorporate at least two door interlocks that are operated by opening the door, at least one being a monitored door interlock.

NOTE : The two door interlocks may be incorporated in the system of the monitored door interlock.

Compliance is checked by visual inspection.

22.104 At least one door interlock shall incorporate a switch that disconnects the microwave generator or its supply main circuit.

Compliance is checked by visual inspection.

NOTE : An equally reliable method of making the disconnection may be used as an alternative.

22.105 At least one of the door interlocks shall be concealed and not operable by manipulation. This door interlock shall operate before any accessible door interlock can be defeated.

Compliance is checked by the following test.

The door is placed in the open or closed position and an attempt is made to operate the concealed door interlock by applying test probe B of **JIS C 0922** to all openings. A straight rod, as shown in Figure 101, is also applied to any openings of the door interlock mechanism.

Door interlocks that operate magnetically are also evaluated by applying a magnet to the enclosure over the door interlock switch. The magnet has similar configuration and magnetic orientation to the magnets that operate the door interlock. It shall be capable of exerting a force of $50\text{ N} \pm 5\text{ N}$ when applied to a mild steel armature having dimensions of $80\text{ mm} \times 50\text{ mm} \times 8\text{ mm}$. In addition, the magnet shall be capable of exerting a force of $5\text{ N} \pm 0.5\text{ N}$ at a distance of 10 mm from the armature.

The door is opened and simultaneously an attempt is made to defeat any accessible door interlock by means of test probe B of **JIS C 0922**.

It shall not be possible to operate the concealed door interlock during the tests.

22.106 The supervision device of the monitored door interlock shall render the appliance inoperable if its switching part fails to control the microwave generator.

Compliance is checked by the following test.

The switching part of the monitored door interlock is rendered inoperative. The appliance is supplied at rated voltage from a supply source having a short-circuit capacity of at least 1.5 kA for appliances having a rated voltage over 150 V and 1.0 kA for other appliances.

NOTE 1 Appliances having a rated voltage less than 150 V and a rated current over 20 A are supplied at rated voltage from a supply source having a short-circuit capacity of at least 5.0 kA.

The appliance is operated with the door closed and an attempt is then made to gain access to the cavity in the normal way. It shall not be possible to open the door unless the microwave generator ceases to function and remains inoperable. The supervision device shall not fail in the open-circuit position.

NOTE 2 The supervision device is replaced for subsequent tests if it fails in the closed circuit position.

NOTE 3 It may be necessary to render other door interlocks inoperative in order to perform this test.

If an internal fuse in the circuit supplying the microwave generator ruptures, the fuse is replaced and the test is carried out two more times. The internal fuse shall rupture each time.

The test is carried out three more times but with an impedance of $(0.4 + j 0.25)\ \Omega$ in series with the supply source. The internal fuse shall rupture each time.

NOTE 4 For appliances having a rated voltage under 150 V and those with a rated current over 16 A, the test with the series impedance is not carried out.

NOTE 5 Switches are replaced each time the internal fuse ruptures if this is stated in the instructions for servicing.

22.107 The failure of any single electrical or mechanical component that affects the operation of a door interlock shall not cause any other door interlock, or the supervision device of the monitored door interlock, to become inoperative, unless the appliance is rendered inoperable.

Compliance is checked by visual inspection and, if necessary, by simulating component failure and operating the appliance as in normal use.

NOTE : This requirement does not apply to components of the supervision device that comply with the test of **22.106**.

22.108 The door interlocks incorporated to comply with **22.103** shall operate before undue microwave leakage occurs.

Compliance is checked by the following test.

All door interlocks except one are rendered inoperative. The appliance is supplied at rated voltage and operated with the load specified in clause **32**. The door opening sequence is carried out in small increments during which the microwave leakage is measured.

The appliance shall comply with clause **32**.

The test is repeated on each door interlock in turn.

NOTE 1 Door interlocks are only tested if they are necessary for compliance with **22.103**.

NOTE 2 It may be necessary to render the supervision device of the monitored door interlock inoperative when carrying out the test.

22.109 There shall be no undue microwave leakage if thin material is introduced between the door and its matching surface.

Compliance is checked by closing the door on a strip of paper having a width of $60\text{ mm} \pm 5\text{ mm}$ and a thickness of $0.15\text{ mm} \pm 0.05\text{ mm}$, the paper being placed between the door and its mating surface.

The appliance shall then comply with clause **32**.

The test is carried out 10 times with the paper in different locations.

22.110 There shall be no undue microwave leakage if the door seals become contaminated by floor residues.

Compliance is checked by the following test.

The door seal is coated with cooking oil. If the seal has an open choke, the trough is filled with oil.

The appliance shall then comply with clause **32**.

22.111 There shall be no undue microwave leakage when the door corners are subjected to distortion.

Compliance is checked by the following test.

The appliance is supplied at rated voltage and operated with the load specified in clause 32. The door and its opening means are manipulated until the largest door gap permitting microwave generation is obtained. A pull force is applied perpendicular to the surface of the door to each corner in turn. The force is slowly increased to 40 N.

During the test, the microwave leakage is measured under the conditions specified in clause 32 and shall not exceed 100 W/m².

After the test, the appliance shall comply with clause 32.

22.112 There shall be no undue microwave leakage and the temperature-sensing probe shall not become damaged, when a probe or its cord is trapped by the door.

Compliance is checked by the following test.

The probe is connected as in normal use, the sensing part or cord being allowed to rest in the most unfavourable position likely to occur. The door is closed against the sensing part of the cord with a force of 90 N applied for 5 s in the most unfavourable place. The force is then released and, if the oven can be operated, the microwave leakage is measured under the conditions specified in clause 32 and shall not exceed 100 W/m².

After the test, the appliance shall comply with clause 32 and the temperature-sensing probe shall comply with 8.1, 15.101 and clause 29.

22.113 There shall be no undue microwave leakage when detachable parts are removed.

Compliance is checked by the following test.

Detachable parts are removed, except shelves, unless a horizontal surface greater than 85 mm in diameter is made available when they are removed.

The appliance shall then comply with clause 32, the load being placed on the horizontal surface as close as possible to the centre of the cavity.

NOTE : In order to avoid detecting non-radiating standing waves, the tip of the instrument probe is not inserted into an opening resulting from the removal of a detachable part.

22.114 Appliances shall be constructed so that shelves do not fall out of their supports when subjected to a load. Shelves intended to be partially withdrawn in use shall not tip when they have partially been removed from the oven.

Compliance is checked by the following test.

A vessel filled with sand or shot is placed on the shelf. The total mass in kilograms is equal to 30 kg/m² of the shelf area. The shelf, with the vessel placed centrally on it, is inserted into the oven and moved as close as possible to one of the side walls. It is left in this position for 1 min and then withdrawn. It is then reinserted, moved as close as possible to the other side wall and left for one minute.

During the test the shelf shall not fall away from its support.

For shelves intended to be partially withdrawn in use, the test is repeated with the shelf pulled out by 50 % of its depth. An additional force of 10 N is applied vertically downwards on the centre of the exposed front edge of the shelf.

During the test the shelf shall not tip.

NOTE: A small angle of deflection is allowed.

22.115 A single fault such as failure of basic insulation or a loose wire bridging the insulation system shall not allow operation of the microwave generator with the door open.

Compliance is checked by visual inspection and, if necessary, by simulating relevant faults. Wires that may become loose are disconnected and allowed to fall out of position but are not otherwise manipulated. They shall not come into contact with other live parts or earthed parts if this results in all door interlocks becoming inoperative.

NOTE 1 Failure of reinforced insulation or double insulation is considered to be two faults.

NOTE 2 Wires secured by two independent fixings are not considered likely to become loose.

22.116 There shall be no access to the cavity through the viewing screen.

Compliance is checked by visual inspection and the following test.

A straight steel rod having a diameter of 1 mm and a flat end is pressed perpendicularly against the viewing screen with a force of 2 N. The rod shall not enter the cavity.

22.117 Interlocks operated by detachable parts shall be guarded so that accidental operation is prevented.

Compliance is checked by visual inspection and by manual test.

22.118 Lights, switches or push-buttons shall only be coloured red if they indicate danger, alarm or similar situations.

Compliance is checked by visual inspection.

23 Internal wiring Clause 23 of JIS C 9335-1 is applicable.

24 Components Clause 24 of JIS C 9335-1 is applicable except as follows. 24.1 and 24.1.4 are respecified in this Standard.

24.1 24.1 of JIS C 9335-1 is applicable except as follows.

NOTE 101 IEC 60989 is not applicable to power transformers that supply the magnetron.

24.1.4 24.1.4 of JIS C 9335-1 is applicable except as follows.

The number of cycles of operation for thermostats is increased to 30 000.

Interlocks are subjected to the following test which is carried out on six samples.

The interlocks are connected to a load that simulates the conditions occurring in the appliance when it is supplied at rated voltage. They are operated at a rate of approximately six cycles per minute. The number of cycles is

- door interlocks: 50 000;
- interlocks only operated during user maintenance: 5 000.

After the test, the interlocks shall not be damaged to such an extent that their further use is impaired.

24.101 Socket-outlets incorporated in class I appliances shall be single-phase, incorporate an earthing contact and have a rated current not exceeding 16 A. The socket-outlets with earthing contact shall not be used for other classes. Both poles shall be protected by fuses or miniature circuit-breakers placed behind a non-detachable cover and having a rated current not exceeding

- 20 A, for appliances having a rated voltage up to 130 V;
- 10 A, for other appliances.

If the appliance is intended to be permanently connected to fixed wiring, or is fitted with a polarized plug, the neutral pole need not be protected.

Compliance is checked by visual inspection.

NOTE : The actuating member of miniature circuit breakers may be accessible.

25 Supply connection and external flexible cords Clause 25 of JIS C 9335-1 is applicable except as follows. 25.1, 25.3, 25.7 and 25.14 are respecified in this Standard.

25.1 Modification:

Appliances shall not be provided with an appliance inlet.

25.3 25.3 of JIS C 9335-1 is applicable except as follows.

Fixed appliances and appliances with a mass greater than 40 kg and not provided with rollers, castors or similar means shall be constructed so that the supply cord can be connected after the appliance has been installed in accordance with the installation instructions.

Terminals for the permanent connection of cables to fixed wiring may also be suitable for a supply cord of type X attachment. In this case a cord anchorage complying with 25.16 shall be fitted to the appliance.

25.7 Modification:

Instead of the types of supply cords specified, the following applies:

Supply cords shall be oil-resistant and shall not be lighter than ordinary polychloroprene sheathed flexible cord (code designation 60245 IEC 57) or equivalent synthetic elastomer sheathed cord.

NOTE 201 Cable conforming to No. 1 of the separate Table of the Ministerial Ordinance concerning the technical criteria for electric appliances (International Trade and Industry Ministry Order No. 85: 1962) and those for which chloroprene rubber mixture or chlorosulfonated polyethylene rubber mixture is used as the insulation or sheathing are considered to be of oil proof equivalent or superior to that required in the specification.

25.14 25.14 of JIS C 9335-1 is applicable except as follows.

For temperature-sensing probes, the total number of flexings is 5 000. Probes with circular-section cords are turned through 90° after 2 500 flexings.

26 Terminals for external conductors Clause 26 of JIS C 9335-1 is applicable.

27 Provision for earthing Clause 27 of JIS C 9335-1 is applicable except as follows. 27.2 is additionally respecified in this Standard.

27.2 27.2 of JIS C 9335-1 is applicable except as follows.

Stationary appliances shall be provided with a terminal for the connection of an external equipotential bonding conductor. This terminal shall be in effective electrical contact with all fixed exposed metal parts and shall allow the connection of a conductor having a nominal cross-sectional area up to 10 mm². It shall be located in a position convenient for the connection of the conductor after installation of the appliance.

NOTE 101 Small fixed exposed metal parts, for example nameplates, are not required to be in electrical contact with the terminal.

28 Screws and connections Clause 28 of JIS C 9335-1 is applicable.

29 Clearances, creepage distances and solid insulation Clause 29 of JIS C 9335-1 is applicable.

30 Resistance to heat and fire Clause 30 of JIS C 9335-1 is applicable except as follows. 30.2 is additionally respecified in this Standard.

30.2 30.2 of JIS C 9335-1 is applicable except as follows.

For appliances that allow a preselected start time and those with a keep-warm function, 30.2.3 is applicable. For other appliances, 30.2.2 is applicable.

31 Resistance to rusting Clause 31 of JIS C 9335-1 is applicable.

32 Radiation, toxicity and similar hazards Clause 32 of JIS C 9335-1 is applicable except as follows.

Compliance for microwave leakage is checked by the following test.

A load of 275 g ± 15 g of potable water having a temperature of 20 °C ± 2 °C, in a thin-wall borosilicate glass vessel having an inside diameter of approximately 85 mm, is placed on the centre of the shelf. The appliance is supplied at rated voltage and operated with the microwave power control at the highest setting.

Microwave leakage is determined by measuring the microwave flux density using an instrument that reaches 90 % of its steady reading in 2 s to 3 s when subjected to a stepped input signal. The instrument antenna is moved over the external surface of the appliance to locate the highest microwave leakage, particular attention being given to the door and its seals.

The microwave leakage at any point 50 mm or more from the external surface of the appliance shall not exceed 50 W/m².

NOTE 101 If compliance with the test is in doubt due to a high water temperature, the test is repeated with a fresh load.

Dimensions in millimetres

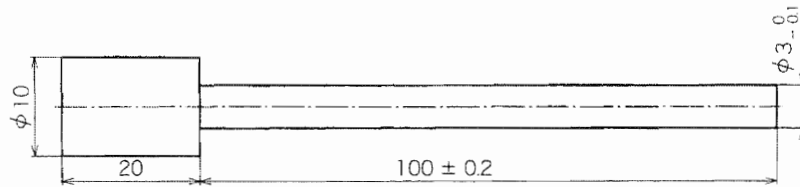


Figure 101 Test rod for interlock concealment

Annexes

The annexes of Part 1 of **JIS C 9335** are applicable.

Annex 1 (informative)

Comparison table between JIS and corresponding International Standard

JIS C 9335-2-90 : 2003 <i>Household and similar electrical appliances—Safety—Part 2-90:Particular requirements for commercial microwave ovens</i>				IEC 60335-2-90 : 2002 <i>Household and similar electrical appliances—Safety—Part 2-90:Particular requirements for commercial microwave ovens</i>			
(I) Requirements in JIS		(II) International Standard number	(III) Requirements in International Standard		(IV) Classification and details of technical deviation between JIS and the International Standard by clause Location of deviation: text Indication method: dotted underlines		(V) Justification for the technical deviation and future measures
Clause	Content		Clause	Content	Classification by clause	Detail of technical deviation	
1 Scope	Safety of microwave ovens for commercial use, their rated voltage being not more than 250 V for single-phase appliances and 480 V for other appliances	IEC 60335-2-90	1	Same as JIS.	IDT	—	
2 Normative references	Normative references in Part 1 and others		2	No description of normative reference	MOD/ addition	A part of the standards referred informatively in IEC are referred normatively in JIS.	The normative references in the Annex AA are added to the list of normative references because the Annex AA under study at present is taken in advance as deviation.

(I) Requirements in JIS		(II) International Standard number	(III) Requirements in International Standard		(IV) Classification and details of technical deviation between JIS and the International Standard by clause Location of deviation: text Indication method: dotted underlines		(V) Justification for the technical deviation and future measures
Clause	Content		Clause	Content	Classification by clause	Detail of technical deviation	
3 Definitions	Definitions of microwave oven, combination microwave oven, cavity, shelf, monitored door interlock and temperature-sensing probe		3	Same as JIS .	IDT	—	
4 General requirement	Principle of safety		4	Same as JIS .	IDT	—	
5 General conditions for the tests	Sample size, testing order, etc.		5	Same as JIS .	IDT	—	
6 Classification	At least class 0I is required for classification of protection against electrical shock		6	At least class I is required for classification of protection against electrical shock	MOD/ addition	JIS recognizes class 0I appliances.	Handling of class 0I appliances is in accordance with Japanese power supplying condition (socket-outlets without earthing).
7 Marking and instructions	Labelling, symbol for equipotentiality, warning and substance to be stated in the instruction		7	Same as JIS .	IDT	—	
8 Protection against access to live parts	Check carried out using test probe		8	Same as JIS .	IDT	—	

(I) Requirements in JIS		(II) International Standard number	(III) Requirements in International Standard		(IV) Classification and details of technical deviation between JIS and the International Standard by clause Location of deviation: text Indication method: dotted underlines		(V) Justification for the technical deviation and future measures
Clause	Content		Clause	Content	Classification by clause	Detail of technical deviation	
9 Starting of motor-operated appliances	Unapplicable		9	Same as JIS .	IDT	—	
10 Power input and current	Tolerance on the indicated value and measured value of rated power input or rated current		10	Same as JIS .	IDT	—	
11 Heating	Setting condition, testing time and temperature measuring place are specified		11	Same as JIS .	IDT	—	
12 Void	No specification		12	Same as JIS .	IDT	—	
13 Leakage current and electric strength at operating temperature	Leakage current and electric strength test in an operating state		13	Same as JIS .	IDT	—	
14 Transient overvoltages	Alternative test by impulse test on a place in which the air clearance does not satisfy a specified value		14	Same as JIS .	IDT	—	

(I) Requirements in JIS		(II) International Standard number	(III) Requirements in International Standard		(IV) Classification and details of technical deviation between JIS and the International Standard by clause Location of deviation: text Indication method: dotted underlines		(V) Justification for the technical deviation and future measures
Clause	Content		Clause	Content	Classification by clause	Detail of technical deviation	
15 Moisture resistance	Inundation test, moisture resistance test and insulation of temperature-sensing probes		15	Same as JIS .	IDT	—	
16 Leakage current and electric strength	Assessment of insulation after moisture resistance test and insulation performance of high voltage power supply transformers		16	Same as JIS . However, test on switch mode power supply transformers is not included.	IDT	JIS specifies additionally the test method for switch mode power supply transformers.	The existing IEC Standard does not correspond to the switch mode power supply transformer, so that the test method which is under study at present is added.
17 Overload protection of transformers and associated circuits	Temperature test simulating a state in which the transformers except the high voltage power supply transformers are overloaded or short-circuited		17	Same as JIS .	IDT	—	
18 Endurance	200 000 times of door opening and closing test		18	Same as JIS .	IDT	—	
19 Abnormal operation	Short-circuit between cathode and anode of the magnetron, no-load operation, fault of controls, potato ignition test and high frequency leakage test		19	Same as JIS .	IDT	—	

(I) Requirements in JIS		(II) International Standard number	(III) Requirements in International Standard		(IV) Classification and details of technical deviation between JIS and the International Standard by clause Location of deviation: text Indication method: dotted underlines		(V) Justification for the technical deviation and future measures
Clause	Content		Clause	Content	Classification by clause	Detail of technical deviation	
20 Stability and mechanical hazards	Stability of appliances and protection against the approach to movable part		20	Same as JIS.	IDT	—	
21 Mechanical strength	Mechanical strength of outer hull and strength of door hinge		21	Same as JIS.	IDT	—	
22 Construc- tion	Requirements for ventilation, requirements of two-door interlocks, protection against door clearance, and distortion of seal and corner, protection against insulation fault and prohibition of access to the cavity through the viewing screen		22	Same as JIS.	IDT	—	
23 Internal wiring	Flexion of internal wiring, withstand voltage, etc.		23	Same as JIS.	IDT	—	

(I) Requirements in JIS		(II) International Standard number	(III) Requirements in International Standard		(IV) Classification and details of technical deviation between JIS and the International Standard by clause Location of deviation: text Indication method: dotted underlines		(V) Justification for the technical deviation and future measures
Clause	Content		Clause	Content	Classification by clause	Detail of technical deviation	
24 Components	Endurance of interlocks and restriction of the use of socket-outlets for appliances		24	Same as JIS . However, socket-outlets for class 0I appliances are not taken into consideration.	MOD/alteration	24.101 The socket-outlets with 3 pole earthing are prohibited to be used for class 0I appliances.	This is because that class 0I is added in 6.1 . If the socket-outlet with 3 pole earthing is used for a class 0I appliance, a class I appliance can be connected and, therefore, the conversion to lower level is prevented.
25 Supply connection and external flexible cords	Classification of power supply cords, folding test of temperature-sensing probes, etc.		25	Same as JIS . However, the cords to be used are limited to be at least of 60245 IEC 57 level.	MOD/addition	JIS gives examples of chloroprene rubber mixture and chlorosulfonated polyethylene rubber mixture conforming to the clause 1 of the Ministerial Ordinance concerning the technical criteria for the safety of electric appliances as the cords of the same level as the oil-resistant cords required in IEC .	JIS makes clear the usability of the cords conforming to the clause 1 of the Ministerial Ordinance.
26 Terminals for external conductors	Prevention of terminal screw from looseness, size of terminal screws, etc.		26	Same as JIS .	IDT	—	

(I) Requirements in JIS		(II) International Standard number	(III) Requirements in International Standard		(IV) Classification and details of technical deviation between JIS and the International Standard by clause Location of deviation: text Indication method: dotted underlines		(V) Justification for the technical deviation and future measures
Clause	Content		Clause	Content	Classification by clause	Detail of technical deviation	
27 Provision for earthing	Prevention of earthing cord from looseness, corrosion resistance, ground continuity test, etc.		27	Same as JIS . However, equipotential terminals are obliged.	MOD/ addition	JIS deals with the external equipotential terminals as voluntary.	In Japan, equipotential connection is not obliged by the setting criteria and the like, so that it is made voluntary in the appliances.
28 Screws and connections	Durability, classification and looseness prevention of screws, etc.		28	Same as JIS .	IDT	—	
29 Clearances, creepage distances and solid insulation	Clearances, creepage distances and thickness of solid insulation		29	Same as JIS .	IDT	—	
30 Resistance to heat and fire	Ball pressure test, glowing wire test, needle-flame test		30	Same as JIS .	IDT	—	
31 Resistance to rusting	Preventive measures against rusting		31	Same as JIS .	IDT	—	
32 Radiation, toxicity and similar hazards	Measurement of the maximum microwave leakage		32	Same as JIS .	IDT	—	
Annexes	As specified in JIS C 9335-1 .		Annexes	Same as JIS .	IDT	—	

Designated degree of correspondence between **JIS** and International Standard: MOD

- Remarks 1 Symbols in sub-columns of classification by clause in the above table indicate as follows:
- IDT: Identical in technical contents.
 - MOD/addition: Adds specification item(s) or content(s) not included in International Standard.
 - MOD/alteration: Alters the specification content(s) included in International Standard.
- 2 Symbol in column of designated degree of correspondence between **JIS** and International Standard in the above table indicates as follows:
- MOD: Modifies International Standard.

Errata for JIS (English edition) are printed in *Standardization Journal*, published monthly by the Japanese Standards Association, and also provided to subscribers of JIS (English edition) in *Monthly Information*.

Errata will be provided upon request, please contact:
Standardization Promotion Department, Japanese Standards Association
4-1-24, Akasaka, Minato-ku, Tokyo, 107-8440 JAPAN
TEL. 03-3583-8002 FAX. 03-3583-0462

100% Recycled paper